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PREVIEW

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**Characteristics of expertise in teaching: Differences in levels of  
expert teachers in solving classroom management problems**

Fager, Jennifer Jeanne, Ph.D.

The University of Nebraska - Lincoln, 1992

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PREVIEW

**CHARACTERISTICS OF EXPERTISE IN TEACHING:**

**Differences in Levels of Expert Teachers in  
Solving Classroom Management Problems**

by

Jennifer J. Fager

A Dissertation

Presented to the Faculty of  
The Graduate College in the University of Nebraska  
In Partial Fulfillment of Requirements  
For the Degree of Doctor of Philosophy  
Interdepartmental Area of  
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Under the Supervision of Professor Alvah M. Kilgore

Lincoln, Nebraska

July, 1992

DISSERTATION TITLE

CHARACTERISTICS OF EXPERTISE IN TEACHING: Differences in Levels

of Expert Teachers in Solving Classroom Management Problems

BY

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# CHARACTERISTICS OF EXPERTISE IN TEACHING:

## Differences in Levels of Expert Teachers in Solving Classroom Management Problems

by

Jennifer J. Fager, Ph.D.

University of Nebraska, 1992

Advisor: Alvah M. Kilgore

The present study examined characteristics of expertise and how teachers at different levels of expertise solve classroom management problems differently. Eighty-four public school teachers and fourteen public school administrators participated in this study. Three groups of expertise were formed via cluster analysis using information provided by public school administrators on the teachers who participated in this study. The groups included: high experts, average experts, and low experts. Performance between groups was compared on classroom management problems, years of teaching experience, and number of college credits taken beyond certification, and three additional exploratory instruments. Exploratory comparisons included: creativity, metacognition, and self-monitoring.

Groups differed significantly on the classroom management problem solving task. The high experts scored significantly higher than the low experts; however, there were no other significant differences between groups. No significant differences were found between groups for years of teaching experience. The high experts and the low experts did differ significantly for number of college credits taken beyond certification. Results of the exploratory analyses indicated that there were no significant differences between groups for creativity or self-monitoring. There was a significant



difference between groups on the metacognition task. Follow-up procedures revealed that high experts differed significantly on goal achievement, as it relates to metacognition from the low experts. An additional follow-up procedure revealed that high experts scored significantly higher than average experts on self-awareness as it relates to metacognition.

In summary, it appeared that high expert teachers performed classroom management tasks better than low expert teachers. In addition, high expert teachers displayed characteristics unique to their group. Scenarios of typical teachers at each level of expertise are included in this study.

PREVIEW

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## CHAPTER 1

### INTRODUCTION

Many different techniques have been used to identify expertise in a variety of domains. The research on expertise is from the broader field of problem solving. This problem solving research, commonly identified as expert/novice problem solving research, specifically examines differences between individuals or groups at different levels of ability in a variety of domains. In each instance, the researcher attempts to identify expertise in his/her domain as it relates to problem solving within the same domain thus attempting to characterize domain specific experts. For example, chess experts are chess players that have reached the level of chess master due to the number of matches they have played and won at the competitive level (Chase & Simon, 1973). Expert x-ray diagnosticians have had years of experience in the medical profession and have become expert at picking up unusual occurrences on x-ray pictures (Lesgold et al., 1988). Regardless of the domain, each "expert" encounters problems to solve and the "expert" must possess certain characteristics to effectively solve the problems.

The study of the characteristics of expertise is not limited to the domains of chess and x-ray diagnosing. Master chess players and x-ray diagnosticians have specific characteristics typical of an expert in their field. Teachers also have characteristics that are specifically identified as typifying an expert teacher. Leinhardt and Smith (1985) suggested certain cognitive skills are required of teachers to solve problems like an expert. An expert teacher must possess a minimum level of subject matter knowledge and lesson structure knowledge. Lesson structure knowledge includes the skills "needed to plan and run a lesson smoothly, to pass easily from one segment to another, and to explain material clearly" (p. 247). Subject matter

knowledge includes the possession of information relevant to the subject being taught, supports lesson structure and is a resource for examples used in a lesson, and constrains lesson structure in that the content of the lesson strongly influences how it is to be taught.

Unlike the master chess player who achieves expert status by winning a number of chess matches, the teacher has not been systematically characterized under a single umbrella of expertise criteria. Expertise in teaching has been examined and measured in a number of ways. Student achievement and the identification of expertise by administrators are but two ways in which teachers have been labeled "expert". Expert teachers, according to Swanson (1990), have over ten years of teaching experience, have a master's degree, have been designated as an outstanding teacher by the building principal, and have been selected as a Mentor Teacher, a teacher similar to that of a Cooperating Teacher. Additional researchers have equated expertise with experience (Berliner, 1986, Carter et al., 1988) although the same researchers acknowledge that experience is not necessarily the same as expertise but a confounding situation that merits further investigation.

While the studies involving experts and novices in and out of the field of teaching have suggested group differences in the results, the role of the expert has not been clearly defined. Studies thus far have identified experts *a priori*, leaving little room for characterization of true expertise. An examination of the skills exhibited by experts may shed some light on the characterization of the expert teacher.

In addition to the cognitive skills examined by Leinhardt and Smith (1985) and the criteria for identifying expert teachers outlined by Swanson (1990) other specific skills should be examined for their relationship to the identification of expertise. Additional skills that merit examination include

metacognitive skills. Teachers should possess metacognitive skills to effectively monitor their behavior in the classroom as it relates to the typical situations the teachers encounter on a day to day basis. They must have the ability to manage a classroom effectively by implementing problem solving skills to handle situations such as behavior problems of the students and knowing precisely how long each instructional session will require. Experts "know that they have a specific body of knowledge (subject matter knowledge) and a repertoire of techniques to solve problems within a specific domain (procedural knowledge). The expert's evaluation of time and effort required to solve a given problem is more accurate than that of the novice" (Seagull & Erdos, 1990, p. 340).

Beyond the characteristics of expertise displayed by teachers outlined above, other fields studying experts have used identification procedures for the purposes of examining expert/novice differences. Although the various domains are not identical in the type problems they encounter nor in the characteristics specific to experts one can examine the broad field of expert/novice problem solving research to gain a better understanding of expertise in general and as it relates to the field of teaching. Chi, et al. (1988) describe experts using seven characteristics that are a result of a synthesis of the research in the field of expert/novice problem solving. These characteristics of expertise include:

1. Experts excel mainly in their own domains.
2. Experts are able to perceive large meaningful patterns in their domain of expertise.
3. Experts are able to perform rapidly in their domain of expertise.

4. Experts see and represent a problem in their domain at a deeper, more principled level than do novices.
5. Experts spend time analyzing a problem qualitatively.
6. Experts have strong self-monitoring skills.
7. Experts are more accurate than novices at judging problem difficulty.

Posner (1988) suggests an additional characteristic.

8. Expertise lies more in an elaborated semantic memory than in a general reasoning process.

In spite of the above criteria, Berliner (1986) concluded that experience and expertise were difficult to differentiate. This idea suggests teachers who are considered experts should have experience in pedagogy, classroom management, and domain specific (content) information. Thus, the additional characteristic of expertise suggests:

9. Expertise and experience are directly related.

These characteristics of expertise suggest an expert possesses unique skills that separate the expert from the non-expert.

The identification of specific characteristics of expertise suggests that experts possess all or most of these characteristics. This assumption suggests that there are other teachers, chess players, and x-ray diagnosticians that do not completely meet the defining characteristics of expertise but are at a level below experts but above the novice. Research on expertise in teaching goes beyond the dichotomous approach of expert and novice. Additional groups of teachers have been identified to lend a broader perspective into the characterization of expertise in teaching. Studies have examined differences between two groups and between more than two groups. Still the problem remains: how to identify expertise.



In addition to expert and novice teachers as a means of categorizing teachers, Carter et al. (1988) suggested a dichotomy of experienced and competent teachers. These competent teachers are not experts by the definition mentioned above but have a higher level of experience than the novice or inexperienced teacher. While the research in the field of expert and novice teachers generally identifies two independent groups, it is often inadequate in describing those teachers in the middle and in defining selection techniques for membership into the groups.

Novice teachers may possess some of these qualities and may actually be an "expert" in one area. It is the possession of all nine qualities that separates the experts from the novices. Leinhardt and Smith suggest, that "although it is unlikely that a teacher could be devoid of competence in one area and still be an expert, teachers with similar outcomes or success levels can have quite different balance of skills" (1985, p. 247). In other words, experts must possess all of the qualities but novices vary in their levels of competence in all of these areas.

### **Statement of the Problem**

Expert teaching can be examined in a single domain where problems exist within a subject or grade level such as social studies or third grade. Difficulties arise due to utilizing a single group when the research is generalized to the total teaching population. However, a problem that transcends subject or grade level lines is classroom management. Research has suggested teachers have been labeled incompetent due to their lack of classroom management skills (Bridges, 1986). Beginning teachers have identified classroom management as one of the biggest problems they encounter in their first years of teaching (UNL Teachers College Report, 1989, 1990). In an effort to address the concerns of beginning teachers with regard to

classroom management and to create a more generalizable expertise taxonomy, this study will examine classroom management problem solving differences and characteristics of expertise.

The purpose of this study was to determine whether expert teachers possessed unique characteristics in classroom management that identify them as "expert". Specifically, this exploratory study proposed to examine whether or not the expert teacher possesses characteristics of expertise as outlined by Glaser and Chi as well as Berliner and Posner. In addition, this study proposed to examine how teachers at various levels of expertise solve classroom management problems.

### **Research Questions**

1. Can expert teachers be uniquely identified based on the set of nine characteristics identified above? Research in the field of expertise has identified experts *a priori* without standardizing procedures. This study intends to use a standardized identification process to identify expertise in teaching.

2. Do expert teachers solve classroom management problems differently than non-expert teachers? Classroom management is a universal teaching problem and will serve as a testing ground for the identified expert teachers. The teachers will be compared to see if the level of expertise is related to the way they solve classroom management problems.

### **Definition of Terms**

For the purposes of this study the following definitions will be used.

*Classroom Management* : Classroom management includes those managerial behaviors related to on-task student behaviors and the reduction of off task or disruptive behaviors (Vasa, 1984).

*Cognition*: Statable knowledge on explicit procedures used by an individual.

*Expert* : A person that provides exemplary performances from which we can learn. They are familiar with well-practiced routines. (Berliner, 1986)

*Metacognition* : Metacognition refers to thinking about thinking. It focuses on self-regulated thinking. Metacognition is what people know and how they apply that knowledge to particular tasks (Jacobs & Paris, 1987).

*Novice* : A novice is a person lacking all the familiarity of well-practiced routines. A novice is not incompetent. A novice is a beginner. (Berliner, 1986)

*Problem Solving* : Problem solving includes satisfactorily solving a problem that is preventing progress from occurring.

*Self-monitoring* : Self-monitoring is the extent to which individuals view their behavior in social situations.

### **Description of the Study Design**

Eighty-four teachers in a midwestern city school district were asked to complete instruments measuring metacognition, self-monitoring, creativity, and classroom management problem solving. In addition, the teachers participating in the study were evaluated on an expertise scale completed by school building administrators. Comparisons were made between groups of teachers based on their levels of expertise.

Instrumentation included five measures related to teacher expertise. The Teacher Identification Instrument consisted of 11 Likert-type questions based upon the literature's definitions of expertise. The Self-Monitoring Measure included 18 true/false statements regarding an individual's perceptions of their self-monitoring skills in certain situations. The creativity test was taken from the Torrance Test of Creative Thinking-Unusual Uses subtest. The Unusual Uses test asked participants to think of unusual uses for tin cans in a set time period. Metacognition was measured via the

Metacognitive Assessment Inventory, an instrument developed by Schraw (Note 2) to measure metacognitive behaviors related to studying. The instrument was adapted to meet the needs of this study. Finally, the classroom management problems included five scenarios describing different discipline difficulties teachers may encounter on a regular basis.

These instruments were chosen to measure the characteristics of expertise suggested by the research in a more standardized fashion. The Teacher Identification Instrument was designed to measure levels of expertise. The metacognition, self-monitoring, and creativity instruments were identified to measure differences in levels of expertise. The classroom management problems were designed to measure group differences in problem solving in the domain of classroom management.

The two expertise scores were analyzed via cluster analysis to create groups as no *a priori* groupings were available. Subsequent analyses were determined based on the number of groups. Comparisons were made between groups based on scores of self-monitoring, creativity, and classroom management problem solving. Data were collected during 45 minute sessions at school buildings where teachers were willing to participate. The researcher collected the data prior to, during, and after the school day to accommodate the participants. Teachers were asked to participate on a voluntary basis and assured of anonymity.

### **Importance of the Study**

Literature in expert/novice research suggested grouping teachers based on arbitrary characteristics of expertise prior to manipulation of variables. This technique has been particularly effective when examining experts in domains such as chess or radiology but in the field of teaching it is more difficult. The difficulty in identifying expert teachers is a result of the lack of

universally accepted characteristics of teaching expertise. Expertise in general has been associated with years of experience and educational level. Expertise in teaching has been equated with achievement scores of children, years of teaching experience, and educational level achieved by the teacher. Standardized definitions of expertise are not available, making it difficult to determine if a teacher is a true "expert".

In order to determine actual expertise or to refine a definition of expertise, the characteristics of expertise outlined by Chi, Glaser, Farr, Berliner, and Posner can be evaluated and measured to determine *a priori* groupings based on the construct of expertise. By identifying expertise in teaching, school districts can have a pre-identified group of teachers available to serve in a number of capacities such as new teacher training, pre-service teacher training, curriculum decision making, etc. In other research studies, teachers were identified as "experts" prior to data collection. While this identification process may have served its purpose during previous research, it is not sufficient for the identification of true expertise.

PREVIEW

## **CHAPTER 2**

### **REVIEW OF LITERATURE**

#### **Introduction**

The focus of the literature on expertise has been on the comparisons of experts and other groups (e.g. novices, experienced non-experts, beginners, etc.) and how they solved problems in specific domains. Expertise has been examined in a number of domains including chess, radiology, and teaching. This review of literature will serve to describe expert/novice problem solving research in a variety of different fields and specifically in the field of teaching. Specifically, the review will examine (1) expert/novice research in and outside the field of teaching, (2) identification procedures used by researchers to characterize expertise in teaching and other fields, (3) characteristics of expertise, and (4) specific skills expert teachers possess, based upon the identified characteristics of expertise.

#### **Expert/Novice Research in Activities Other Than Teaching**

Studies have examined the differences between experts and novices in a variety of fields. Chase and Simon (1973) examined expert and novice chess players' abilities to reconstruct large patterns of chess positions after a few seconds of viewing a chess pattern. The ability to solve classical mechanics problems was investigated by Hardiman et. al (1989). Subjects were given a number of classical mechanics problems that required the application of one or more principle of mechanics. Subjects were asked to categorize the problems based on similarities among problems. Experts and novices in the field of physics were asked to categorize physics problems by sorting the problems based upon criteria each expert or novice set as his/her rationale for categorizing the problems (Chi et al., 1982).

In addition, researchers have studied experts and novices in electronics, architecture, and radiology. Egan and Schwartz (1979) asked subjects to reconstruct symbolic drawings of circuit drawings. In architecture, Akin had subjects recall building plans. Expert and novice radiologists were studied as they made diagnostic decisions for patients based on x-ray slides (Myles-Worsley, Johnson, & Simons, 1988).

One researcher studied subjects' abilities to solve problems in a general domain. In a series of experiments, Ross et al. (1989) used a set of riddles to measure problem solving abilities between informed and uninformed subjects who were 120 university undergraduate students. The subjects were asked to solve 10 riddles and three buffer riddles to which no clues were provided. The informed subjects were given clues to the solutions in the form of sentences prior to the riddle solving task. In the first experiment the subjects received the buffer riddles at the top of the list of riddles. In the second experiment the buffer riddles were at the end of the list. In the third experiment an additional group was added. This additional group consisted of subjects from the same subject pool, however, they were not given a complete set of clues. The clues provided to these subjects were clues to only half of the ten riddles. The researchers found that subjects who received copies of potential responses to riddles prior to receiving the riddles (informed subjects) were more likely to solve the problems.

Others have researched expert/novice problem solving in "real-life" settings. Murphy and Wright (1984) examined subjects' abilities to categorize psychological disorders. Subjects consisted of "real-world" experts in the field of clinical psychology and others with training in clinical psychology. Experts included 12 supervisors at a residential treatment program for emotionally disturbed children. These subjects had advanced degrees in clinical

psychology, special education, social work, or psychiatric nursing and had worked in the program for at least 3 years. A second group of experienced counselors included 21 college students who had participated in the summer program. The third group included beginning counselors who were undergraduate students new to the program with some work experience involving children. The fourth group, novices, included undergraduate students with no work experience with children.

The subjects in the four groups were asked to describe the typical characteristics of an aggressive child, a depressive child, and a disorganized child. The researchers found that the experts had richer representations of the categories and came to a closer consensus on the features of the types of children. The experienced group and beginning groups did not provide many more characteristics than the novices and did not form a consensus on features at a significantly higher level than the novices.

### **Expert/Novice Research in Teaching**

Differences between experienced and inexperienced teachers have been examined in laboratory settings (Housner & Griffey, 1985, and Peterson & Clark, 1978). Teachers were randomly assigned to teach groups of students and the students were randomly assigned to each group. Housner and Griffey (1985) compared eight elementary physical education teachers with five or more years of teaching experience and eight teachers in training at the University of Texas. The subjects were videotaped during a lesson they were demonstrating to four children ranging in age from seven to nine years. Peterson and Clark examined twelve elementary school teachers while giving instruction to 288 students grouped into 36 groups of eight students during a social studies lesson. Both studies asked participants to think aloud when making instructional decisions and required that the teachers teach a set